where verification is within easy range, but with conceptual symbolism, the moulding by experience is indirect. Hence the divergent theories of things, ethical types, and æsthetic standards. Prof. James stoutly maintains that with these experience has had little or nothing to do. And he is so far right in that they rose to the clouds (or, if it sound better, the empyrean) of conception, from the solid (*i.e.* verifiable) ground of experience, and can only be tested in so far as their conclusions can be brought down to the same practical and mundane sphere. For the rest, as we have elsewhere suggested, our theories of things and interpretations of nature are subject to a process of elimination through incongruity, whereby conceptions incongruous with any individual system of mental symbolism strive in vain to enter therein and become incorporated therewith.

We have presented this question rather as it had formulated itself in our own mind before we had read Prof. James's work, than as it is set forth in his final chapter, to which we must now refer our readers. And we have dwelt upon the point at some length that our biological readers may see the bearing of the use-inheritance question in the mental field. Prof. James is on the side of Weismann, and rejects use-inheritance. Our own position is that of anti-dogmatism. We think use-inheritance is still upon its trial, and we desire to see fair play. Mr. Platt Ball's valuable discussion does not get down to the root of the question, which is really one of the origin of variations. We want more experimental evidence. But crucial experiments are hard to devise.

We regard Prof. James's work as an exceedingly valuable contribution to psychological literature; and trust that in a second edition he will make the index in some degree worthy of the volumes, the treasures of which it at present very inadequately indicates.

C. Lloyd Morgan.

THE ANNUAL REPORT OF THE UNITED STATES GEOLOGICAL SURVEY.

Ninth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1887–88. By J. W. Powell, Director. (Washington, 1889.)

A CONSIDERABLE part of this volume is occupied by the reports of the Director and of his principal assistants on the progress in work for the year 1887–88. Of these reports, several touch upon topics of general interest, but as they are more or less of a preliminary nature, we shall restrict ourselves to a notice, necessarily brief, of the larger and later part of the volume; that containing the papers accompanying the official report. The first of these, drawn up by Captain C. E. Dutton, gives a history of the Charleston earthquake on August 31, 1886, with a discussion of the observations collected in order to determine the position, depth, and velocity of the shock. The memoir begins with three accounts of the earthquake, contributed by eye-witnesses. The first is written in a graphic, perhaps over picturesque style, but as it was originally composed by one of the staff of a daily newspaper for public consumption, the roar of the young lion is to be expected; the others are shorter, simpler, but in some respects more valuable. At Charleston the first and principal shock occurred about 9.50 p.m. At that time the writer of the popular account was at work, as usual, in the office of the *Charleston News and Courier*, in a room on the second floor. His attention was first attracted by a sound, apparently from below, which was accompanied by a perceptible tremor, much as if a heavily-loaded dray were passing by. For two or three seconds the occurrence excited no surprise or comment:—

> "Then, by swift degrees, or all at once—it is difficult to say which—the sound deepened in volume, the tremor becoming more decided; the ear caught the rattle of window-sashes, gas-fixtures, and other movable objects.... The long roll deepened and spread into an awful roar that seemed to pervade at once the troubled earth and the still air above and around. The tremor was now a rude, rapid quiver that agitated the whole lofty strong-walled building, as though it were being shaken—shaken by the hand of an immeasurable power; . . . there was no intermission in the vibration of the mighty subterranean engine. From the first to the last it was a continuous jar, adding force with every moment, and as it approached and reached the climax of its manifestation, it seemed for a few seconds that no work of human hands could possibly survive the shocks. . . . For a second or two it seemed that the worst had passed, and that the violent motion was subsiding. It increased again, and became as severe as before. . . . The uproar slowly died away in seeming distance. The earth was still."

The earthquake also was very severe at Summerville, a village 22 miles to the north-west, where some slight preliminary shocks had been felt on August 27 and 28, which, however, were not perceived at Charleston. Other shocks occurred at Charleston during the month following, but fortunately none were severe. But the devastation caused by the great shock was lamentable: 27 persons were killed; at least thrice that number died afterwards from hurts, or the indirect results of the earthquake; not more than half-a-dozen houses escaped injury; many buildings were practically destroyed. The numerous illustrations, taken in many cases from photographs, enable the reader to judge of the devastation. "Hibernian Hall," with two broken columns, projecting from a mass of *débris*, the sole remnants of a portico, might, at the present day, suggest to some minds a political interpretation. The work of the jerry-builder—who evidently exists in Charleston as in London—was revealed by the earthquake, which proved to be a satisfactory, though expensive test of the relative value of different building materials. Fissures and craterlets were formed in the surrounding country, from which water and sand were ejected. The tracks of railways were distorted and otherwise injured; and in one case a train was wrecked by being thrown off the rails.

Captain Dutton's observations have enabled him to construct a map of the isoseismal lines, and to estimate the depth and velocity of the shock. These "isoseisms" are arranged about two "epicentra," which lie on a straight line running rather west of south, about 13 miles apart, and nearly as much west of Charleston. The curves around the northern one are almost circular; around the southern one they are somewhat elongated and rather distorted ovals. To the focus of the former a depth of 12 miles is assigned, with a probable error of less than 2 miles; to that of the latter, a depth of nearly

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8 miles, but here the data are less complete. The velocity of the shock is estimated at nearly 5200 metres a second. Large numbers of observations are recorded and discussed in their practical and theoretical bearings, and the memoir is enriched by numerous illustrations, which, as usual, are admirably executed.

The second memoir, by Prof. N. S. Shaler, describes the geology of the district about Cape Ann (Massachusetts). This district consists entirely of igneous rocks, but it affords exceptional advantages for the study of dykes, of the phenomena of joints, and of the superincumbent drift, while on its coasts the relation of wave-work to ice-work can be readily examined. This memoir, as might be anticipated, is not of such exceptional interest as the preceding one; the illustrations, however, are excellent, and in several cases will be valuable to students who cannot travel far afield.

The third memoir, by Mr. W. H. Weed, "On the Formation of Travertine and Siliceous Sinter by the Vegetation of Hot Springs," is one of much general interest. A large number of facts have been collected and co-ordinated by the author, which establish, as he believes, the following conclusions: (*a*) that the plant-life of the calcareous Mammoth Hot Springs waters causes the deposition of travertine, and is a very important agent in the formation of such deposits; (*b*) the vegetation of the hot alkaline waters of the geyser basins eliminates silica from the water by its vital growth, and produces deposits of siliceous sinter; (*c*) the thickness and extent of the deposits produced by the plant-life of thermal waters establishes the importance of such vegetation as a geological agent. The effect of organisms in promoting mineral accumulation, indirectly by decomposition after death, or directly during life, has long been recognized, but it is interesting to find that some algæ, like some corals, may claim to be called "reef-builders."

A short memoir on the geology and physiography of a part of North-Western Colorado, Utah, and Wyoming concludes the volume. As may be inferred from our brief outline of its contents, it is not less interesting than any one of its eight predecessors, and it abounds in illustrations admirably executed. In this respect, unfortunately, geological works published in Great Britain cannot be compared with those of the United States of America. T. G. BONNEY.

OUR BOOK SHELF.

On the Eggs and Larvæ of some Teleosteans. By Ernest W. L. Holt. (Transactions of the Royal Dublin Society, Vol. IV. Part 7, February 1891.)

IN 1890 the Royal Dublin Society appointed a Committee for the purpose of investigating the fishing grounds on the west coast of Ireland, and they voted a considerable sum of money for the cost of the expedition. This sum was increased by a vote in aid from the Irish Government, who thus properly assisted the efforts of a private Society in attempting a work of great general utility. Here it is not our intention to refer in any detail to the general work done during the last year by the expedition, which was under the charge of several well-known biologists, and which we are glad to learn is being continued this year, under even more favourable auspices than before; but to call attention to a report by Mr. Ernest Holt on the eggs and larvæ of some Teleosteans met with in the first year's cruise. The ova were collected between June 12 and July 11, 1890, and the observations made thereon, with the series of beautiful drawings now before us, were laid before the Royal Dublin Society in November of the same year, while the memoir itself was published in February last. All the observations and drawings of the living forms were made on board ship, but the bad weather generally encountered during the cruise left much to be desired in the way of facilities for microscopical study. It must also be remembered that the main object of the expedition was an inquiry into the presence of "fish grounds," into the condition of the reproductive organs and food of adult fishes, and that these special researches of Mr. Holt were conducted only in such time as could be spared from these other duties.

Under all these circumstances it is surprising that so much good work was done, the ova of twenty-two forms having been more or less carefully investigated. Most of these were pelagic ova. The methods used for their capture were: (1) towing at the surface small ring-nets of fine cheese cloth at the sides of the vessel whilst trawling; (2) sinking larger ring-nets and a large triangular midwater net, after Prof. McIntosh's pattern, to a fathom or so below the surface, and allowing the ship to drift with them for a short time; (3) trawling from the ship's boats with a small naturalist's trawl with muslin net—owing probably to some defect in the latter, this method was not very successful. The first method proved by far the most productive. The following were the species examined. The ova and larvæ of those with an asterisk are figured in detail in the plates. *Scomber scomber*, **Trachinus vipera*, *Trigla gurnardus*, **Gobius niger*, **Callionymus lyra*, **Cepola rubescens*, **Lepadogaster bimaculatus*, *Labrus maculatus*, *Crenilabrus melops*, *Merluccius vulgaris*, *Macrurus* (?), **Rhombus lævis*, **Pleuronectes microcephalus*, *P. cynoglossus*, *Clupea sprattus*, **Solea* (?), **S. lutea* (?), **A. Motella*-like form, **Ctenolabrus rupestris* (?), **A Coris*-like form, and four unidentified forms which are figured. There is also a table showing the comparative dimensions of the ova.

This memoir forms a very important contribution to the history of the development of our native fish, and is exceedingly well printed and illustrated.

The Hand-book of Games. Vol. II. Card Games. New Edition. (London: George Bell and Sons, 1891.)

THE first volume of this work dealt with table games, while the present one treats entirely of card games. Of the twenty-two games here described, eleven are new, or we should rather say did not appear in the first edition, and several of the old games, such as Boston, quinze, lansquenet, &c., which have become obsolete, are omitted.

The game that stands above all others is undoubtedly whist, and to play it well requires no small amount of scientific reasoning. Bearing this in mind Dr. William Pole treats of it in a very able manner, laying before the reader a good account of the game as it is played to-day. In a general view of the modern game, he points out that it was Edmund Hoyle's book which, in 1743, was the first to bring the game to a definite shape. Then followed William Payne's "Maxims," published in 1770, and T. Mathews's "Advice to the Young Whist Player," written in 1800. It is in these three books that the game as then played is fully described. In the later works of "Cavendish" and Clay, the game now known as "modern whist" is expounded, and the author, by making a judicious use of all the above-mentioned authorities, has, in the space of about 100 pages, written both an instructive and refreshing essay on the subject in question.

In regard to the other games treated of, we may note that they are all written by the best authorities. Thus solo

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